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FAQ and overview compare requirements for DVB-T2 Receiver requirements

FAQ – technical T2-IRD requirements

1. **DVB-T2**   **Q1**. Is DVB-T2 required for all IRDs?

A1. No, DVB-T2 is still (2010) optional/recommended for the IRDs. Basic IRDs only supporting DVB-T is still accepted. The plan is to mandate DVB-T2 in new IRD models from 2012.

2. **DVB-T2**   **Q2**. Is it required support for TFS and 1.7Mhz bandwidth for DVB-T2?

A2. No, it is not required for the Teracom/Boxer DVB-T2 IRDs to support TFS nor 1.7 MHz.

3. **CI+**   **Q3**. Is Common Interface Plus extensions (CI+) mandatory for T2-IRDs with Common Interface (CI) from day one?

A4. Yes, all DVB-T2 IRDs with CI shall support CI+ from start.

(New DVB-T IRDs with CI (not supporting DVB-T2) that are released on the market during 2010-2011, CI+ is not mandatory but recommended. From 2012 it will become mandatory also for these DVB-T IRDs).

4. **Multi audio**   **Q4.** HE.AAC/E.AC3/AC3 Multichannel audio decoding down to (2.0) stereo is to any desired format, like AC3 or PCM or is there any preferred factory default mode the IRD shall have?

A4. Factory default mode for multichannel audio broadcast after the audio decoding is to down-mix it and output it as stereo PCM on HDMI. IRDs may during viewing let the user change this mode of the output format to e.g. AC3 stereo, AC3 multi or DTS etc as desired or let user change default settings from factory default. (More info see NorDig Unified IRD spec ch 6.2 requirements and ch 16 factory default).

5. **DVB SI HD Simulcast**   **Q5**. There is no mention for the use of HD LCN or HD/SD switching within the SI chapter. Can this be clarified if there is any intention to use these functions?

A5. The (DVB-T2) IRD requirements for Teracom/Boxer DTT networks are based on NorDig Unified IRD specification (and not the UK DTG D-book). (The terms HD LCN and HD/SD switching is likely coming from UK-D-book). In NorDig there is no extra descriptor for HD LCN to be used in NIT. Instead NorDig specifies that HDTV services (service type 0x19) shall have priority for a certain LCN compared to a SDTV (service type 0x01, 0x16), see chapter NorDig Unified 12.1.4 and 13.2.1.1.
In addition NorDig specifies for HDTV IRDs the capability to (quasi-static) hide the SD version for some HD and SD simulcasting services via the Linkage type 0x82 (see ch 12.3.4).
Dynamic changes in broadcast (like changes of codec MPEG2 SD ↔ MPEG4 HD, change of PID values for regional insertion etc), the IRDs shall be able to handle and follow these dynamic changes with some disturbance without user interaction (see 12.1.1 and 6.1.3).

6.	**DVB SI Target Region Descriptor**	**Q6**. Is the new DVB SI Target Region Descriptor mandatory for T2-IRDs or planned to be used in the DVB-T2 broadcast? **A6**. No, not at this stage for Swedish DTT network.
7.	**DVB SI text compression**	**Q7**. When is the target date to decide SI-compression/de-compression scheme for Sweden (or NorDig?)? Will it be same as UK DTG are planning to do? **A7**. The plan is that it specified and proposed into NorDig during spring 2010 with target publication mid 2010. It needs to be optimised for the used Nordic languages to achieve the requested compression efficiency. Important for IRDs not supporting this, is that they shall ignore/skip the complete SI fields that is compressed (text strings starting with 0x1F or other for the IRD unknown values). It will not be exactly the same as UK DTG is planning to use (Huffman and with tables optimised for English spoken language), for example it need to adjusted for Nordic languages.
8.	**Front-End VHF**	**Q8**. Is VHF required and will it really be used in the DVB-T2 broadcast? **A8**. VHF band III and UHF band IV-V is required for all IRDs. VHF will be used from launch of DVB-T2 at the end of 2010 (for Multiplex 7 in the Swedish DTT network).
9.	**CA CSA3**	**Q9**. Is DVB new CSA3 required for descrambling? **A9**. Not at this stage. The CA is still based on the DVB CSA version 2. (The requirement in IRDs for CSA3 has been removed in latest update 27 April 2010. The plan is still to include this in new IRDs from 2012).
10.	**DVB-T/-T2 modes**	**Q10**. OK that all DVB-T and DVB-T2 modes are required for the IRDs, but which mode(s) are actually currently used in the Swedish DTT network? **A10**. All IRDs shall support all DVB-T/-T2 modes as specified in NorDig Unified. As today the current Swedish DTT network has 3 DVB-T modes (all for UHF band) and 5 DVB-T2 modes (2 for VHF and 3 for UHF band). For more description regarding the used DVB-T/-T2 modes, see below.

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IRD requirement compare NorDig vs DTG D-Book

An indicative overview compare table between NorDig Unified IRD specification v2.1 + Teracom/Boxer additional requirements versus DTG D-Book v6.0/v6.1 IRD requirements. Observe, Teracom has made some asumptions regarding the DTG columns, see only the DTG columns as pure indicative information, errors may excist in these columns, Teracom does not have the detailed knowlegde of exact UK DTG D-book requirements, refer to the DTG D-book v6.1 or later for the exact requirements for UK Freeview.

Features	IRD NorDig HD-IRD DVB-T1	NorDig HD-IRD DVB-T2	DTG SD-IRD DVB-T1	DTG HD-IRD DVB-T2
Front-End (Terrestrial)				
DVB-T1	M	M	M	M
DVB-T2	-	M	-	M
VHF band III (174 – 230 MHz)	M	M	-	-
UHF band IV+V (470 – 862 MHz)	M	M	M	M
S-band VHF and UHF (for re-distr in cable networks)	O	O	-	-
8 MHz (for UHF)	M	M	M	M
7 MHz (for VHF)	M	M	-	-
1.7 MHz (for VHF)	-	-	-	-
SFN	M	M	-	-
SFN outside guard degradation	M	M	-	-
Automatic search and best service selection	M	M	?	?
Signal Quality indicator	M	M	-	-
DVB-T performance, C/N 64QAM, 2/3 for Gaussian	18.7 dB	18.7 dB	18.9 dB ?	18.9 dB ?
DVB-T performance, C/N 64QAM, 2/3 for 0dB echo	23.2 dB	23.2 dB	-	-
DVB-T performance, Noise Figure, UHF + VHF	7 dB	7 dB	?	?
DVB-T2 full spec mandatory part	-	M	-	M
DVB-T2 Time Frequency Slicing	-	-	-	-
DVB-T2 performance, C/N 256QAM, 3/5 for Gaussian	-	18.5 dB	-	TBD ?
DVB-T2 performance, C/N 256QAM, 3/5 for 0dB echo	-	21.3 dB	-	-
DVB-T2 performance, Noise Figure, UHF + VHF	-	6 dB	-	?
Upgrading IRD system software				
Over-the-air upgrading	M	M	M	M
Video decoding/processing				
MPEG-2 MP@ML SDTV video	M	M	M	M
MPEG-4 AVC MP@L3 SDTV video	*M*	*M*	-	*M*
MPEG-4 AVC HP@L3 SDTV video	*M*	*M*	-	?
MPEG-4 AVC HP@L4 HDTV video	M	M	-	M
MPEG4 stills	M	M	-	M
14:9 presentation	-	-	?	?

Features	IRD **NorDig** **HD-IRD** **DVB-T1**	**NorDig** **HD-IRD** **DVB-T2**	**DTG** **SD-IRD** **DVB-T1**	**DTG** **HD-IRD** **DVB-T2**
Audio decoding/processing				
MPEG-1 L.II audio decoding up to 2.0 (stereo)	M	M	M	M
HE AAC Level 4 audio decoding, up to 5.1	M	M	-	M?
Dolby Digital Plus E-AC3 audio decoding, up to 5.1	M	M	-	M?
HE AAC & E-AC3 down-mix 5.1 to stereo	M	M	-	?
Pass-through on digital audio output (HE AAC, E-AC3)	M(1)	M(1)	-	?
Transcode, in HE-AAC &/or E-AC3 to out AC3 &/or DTS	M (1)	M(1)	-	M (E-AC3)
Audio stream mixing (for visual &/or hearing impaired)	O	O	?	?
Factory default prio in case of multiple audio streams	M	M	?	?
Subtitling				
DVB (SDTV) subtitling, default on or off	M (on)	M (on)	M (off)	M (off)
DVB upscale SD Subtitling to HD video	M	M	-	M
DVB HDTV Subtitling, default on or off	M (on)	M (on)	-	-
EBU Teletext subtitling (subtitling pages), default on or off	M (on)	M (on)	-	-
nordic charcters (å, ä, ö, œ, æ, ø…)	M	M	-	-
Teletext and API				
EBU Teletext (normal pages)	M	M	-	-
DVB MHP	O	O	-	-
SD MHEG5	-	-	M	M
HD MHEG5	-	-	-	?
nordic charcters (å, ä, ö, œ, æ, ø…)	M	M	-	-
Conflict handling Teletext and API Text (MHP/MHEG5…)	M (2)	M (2)	-	-
EPG API application	M (2)	M (2)	-	-
CA & CPCM				
Basic CA algorithm, CSAv2	M (3)	M (3)	O	O
DVB Common Interface (CI) for iDTV	M (4)	M (4)	M (EU)	M (EU)
DVB Common Interface Plus (CI+) for iDTV	O (4) (M 2012)	M (4)	-	-
Embedded CA,	(3)	(3)	-	-
Smartcard Interface for embedded CA (2)	M (3)	M (3)	-	-
DTCP on removable media / external MPEG interface	(M)	(M)	-	M

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Features	IRD NorDig HD-IRD DVB-T1	NorDig HD-IRD DVB-T2	DTG SD-IRD DVB-T1	DTG HD-IRD DVB-T2
PSI/SI – signalisation				
NorDig Logical Channel Numbering (v1 + v2)	M	M	-	-
DTG D-book Logical Channel Numbering	-	-	M	M
Prio HD, MPEG2 before SD and MPEG2 services	M	M	-	-
NorDig (SDT) HD-SD simulcast (hide SD version)	M	M	-	-
DTG (NIT) HD Simulcast LCD (rearrange SD and HD)	-	-	-	M
EIT, extended info (longer text description)	"M"	"M"	-	?
nordic charcters (å, ä, ö, œ, æ, ø…)	M	M	-	?
NorDig HDCP control (PMT descr)	M	M	-	-
DTG D-book HDCP control (EIT descr)	-	-	-	M
DTG D-book Compressed text strings (Huffman+BBC table)	-	-	-	O?
NorDig Compressed text strings	- (future)	- (future)	-	-
SD/HD Event linkage	-	-	-	?
PVR features				
Boxer Navigator (series + extra metadata)	*	*	-	-
NorDig PVR basic (series)	O	O	-	-
NorDig PVR adv (record lists etc)	*future*	*future*	-	-
DTG D-book PVR basic (series)	-	-	O	O
DTG D-book PVR adv (record lists etc)	-	-	*future*	*future*
RCT (trailer booking)	-	-	O	O
Interfaces (excl CA)				
Analogue SD video output (either SCART, component, composite, S-video)	M	M	?	?
Analogue SD video output, SCART			M?	M?
HDMI with HDCP	M	M	-	M?
Analogue component YUV/YPbPr for HDTV signal (5)	F) (5)	F) (5)	-	?
Digital Audio Output (e.g. SPDIF)	O	O	?	?

(1): For IRDs with digital audio output (eg SPDIF)	M: Mandatory
(2): For IRDs with DVB MHP API	O: Optional
(3): For IRDs with embedded CAS (Viaccess)	R: optional but highly recommended
(4): For IRDs with CommonInterface	F: Forbidded higher video raster than 720x576
(5): Max analogue video output 720x576	on: Factory default mode shall be on
? : uncertain if requirement is mandatory or optional	off: Factory default mode shall be off

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Planned and used DVB-T/-T2 modes for Swedish DTT network

DVB-T modes, used modes today (some changes my occur in the future)

VHF	Not in use
MOD	
Code Rate	
FFT	
Guard Interval	
Hierarchical	
BW	
Bitrate TS	

UHF	DVB-T UHF 1 "long"	DVB-T UHF 2 "normal"	DVB-T UHF 3 "regional"	
MOD	64-QAM	64-QAM	64-QAM	
Code Rate	3/4	2/3	2/3	
FFT	8K	8K	8K	
Guard Interval	1/4	1/8	1/32	
Hierarchical	non	non	non	
BW	8MHz	8MHz	8MHz	
Bitrate TS	22.394	22.118	24.128	Mbps

DVB-T2 modes, as planned today (some changes my occur in the future)

VHF	DVB-T2 VHF 1 "xlong"	DVB-T2 VHF 2 "normal"	
Nldpc	64800	64800	
MOD	256-QAM-R	256-QAM-R	
Code Rate	3/4	2/3	
FFT	32KN	32KN	
Guard Interval	1/8	19/256	
Pilot Pattern	PP2	PP4	
SISO / MISO	SISO	SISO	
ISSY	None	None	
DNP	No	No	
BB-Mode	HEM	HEM	
BW	7MHz	7MHz	
Bitrate TS	31.788544	**30.9531321**	Mbps
Coverage	~4%	~50%	

UHF	DVB-T2 UHF 1 "xlong"	DVB-T2 UHF 2	DVB-T2 UHF 3 "normal"	
Nldpc	64800	64800	64800	
MOD	256-QAM-R	256-QAM-R	256-QAM-R	
Code Rate	3/4	3/5	2/3	
FFT	32KE	32KE	32KE	
Guard Interval	1/8	19/256	1/16	
Pilot Pattern	PP2	PP4	PP4	
SISO / MISO	SISO	SISO	SISO	
ISSY	None	None	None	
DNP	No	No	No	
BB-Mode	HEM	HEM	HEM	
BW	8MHz	8MHz	8MHz	
Bitrate TS	37.12043711	32.49105146	**36.55190642**	Mbps
	~15%	~57%	~84%	

QAM-R: QAM with rotated constellation,
32KN: 32K FFT with "normal" (classical) bandwidth usage (e.g.in VHF ~6.656MHz of a 7MHz, in UHF ~7.607MHz of a 8 MHz),
32KE: 32K FFT with extended bandwidth usage (e.g. in UHF ~7.768MHz of a 8 MHz)
ISSY: Input Stream Synchroniser, DNP: Deleted Null Packet, BB: BaseBand frame, HEM: High Efficiency Mode